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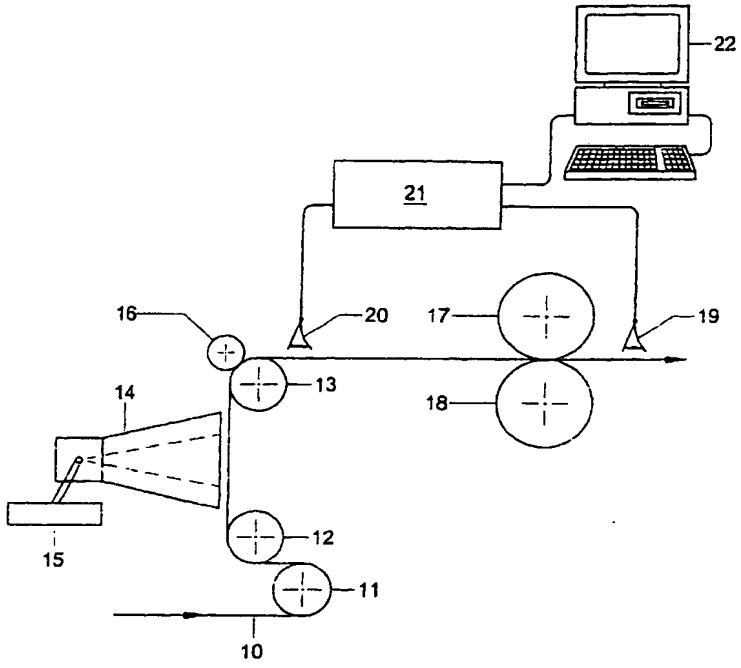
(54) Title: METHOD FOR PROVIDING SCORE LINES IN A WEB OF PACKAGING MATERIAL



(57) Abstract: A method for providing score lines in an advancing web of packaging material (10) with the aid of a controllable laser beam (14, 15), wherein the score lines are provided in register with a regular pattern present on the advancing web (10), which regular pattern is formed by creases, the position of which is detected by means of an optical sensor (19)

WO 02/18123 A1

METHOD FOR PROVIDING SCORE LINES IN A WEB OF PACKAGING MATERIAL

TECHNICAL FIELD

This invention relates to a method for providing score lines in an advancing web of packaging material with the aid of a controllable laser beam, wherein the score lines are provided in register with a regular pattern present on the advancing web.

BACKGROUND ART

Such a method is known from EP-B-0,357,841. The regular pattern on the advancing web there consists of the print on that web. This method is eminently satisfactory for packages which, after being formed and filled, only need to be sealed or glued, such as sachets for powders, wraps for candy bars and packs for coffee, and the like. Problems can arise when the packages, after being filled, are to undergo other operations, such as, for instance, the provision of a pouring spout in packages for liquid contents, such as fruit juices, milk and the like. The position for providing such a pouring spout must be related to the edges of the package, which edges, as a result of a register deviation, may be displaced relative to the standard of the printing pattern on the material web.

OBJECT OF THE INVENTION

The problem to be solved therefore consists in the score lines having to be in register with the creases to be provided in the material web, which creases subsequently form the edges of the liquid pack.

DISCLOSURE OF THE INVENTION

The invention provides a solution to this problem in that the regular pattern consists of creases, the position of which is detected by means of an optical sensor.

Over the method known from EP-B-0,357,841, the method according to the invention has the advantage that also an unprinted material web can be processed in manufacturing liquid packages. With both printed and unprinted material webs, there is a choice between providing the score lines first and then the creases, or doing this the other way around.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the method according to the invention will now be further elucidated with reference to the drawing. In the drawing:

Fig. la shows a top surface of a liquid pack in cross section with a correctly provided pouring spout;

Fig. 1b shows a top surface of a liquid pack in cross section with an incorrectly provided pouring spout;

Fig. 2 shows a diagram for carrying out the method according to the invention; and

Fig. 3 shows an example of detecting a crease or a score line with the aid of an optical sensor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 is a cross-sectional representation of a top surface 1 of a liquid pack, consisting of a multilayered packaging material, for instance cardboard-polyethylene-aluminum-polyethylene. Provided on the surface 1 is a pouring spout holder 2, provided with screw thread 3 for screwing thereon a protective cap, not shown. In the holder 2 a push-through pouring spout 4 is incorporated.

Provided in the layer of cardboard is a weakened so-called score line 5, which is positioned such that upon the pouring spout 4 being pushed downwards, the top surface 1 tears along that score line 5 and so the pouring spout 4 can penetrate into the liquid pack.

In Fig. 1b, the score line 5 is displaced relative to the pouring spout 4, which, as a consequence, cannot be pushed through the top surface 1 of the liquid pack. Such a displacement of a score line can occur in a method according to EP-B-0,357,841 when the print, for instance as a result of elongation and/or shrinkage and/or occurring slip of the material web, exhibits a deviation in register with respect to the creases.

In the schematic diagram of Fig. 2, the left-hand portion is identical to the corresponding part of Fig. 1 of EP- B- 0,357,841. The material web 10 is passed via guide rollers 11, 12, 13 along a scanner 14. This scanner 14 can deflect the laser beam coming from a laser source 15 in two mutually perpendicular directions and thus "write" random figures - the score lines - on the material web 10. Of course, this involves a focus correction

(Z-correction). The shape of the figures to be written depends on the advancing speed of the material web 10, which is measured by means of a speed sensor 16. The "writing" of a figure, with the laser beam, in register with the pattern on the material web – that is, the provision of a score line – can be controlled from a mark provided on the print of the material web and with the aid of the speed sensor 16 implemented as pulse generator. This mark can also be formed by the creases provided on the printed, or unprinted, side of the material web.

The material web 10 is subsequently passed between a pair of rotary rolls 17, 18, which are provided with complementarily configured die forms for providing creases in the material web 10.

The crease pattern to be provided by the rolls 17, 18 is such that through folding along these creases, a liquid pack of the desired shape can be manufactured.

Folding, filling and sealing liquid packs can be done starting from flat blanks, which, simultaneously with the provision of creases, are cut out from the material web 10. Accordingly, the follow-up operations then take place on the basis of loose unit packages.

These follow-up operations can also be done starting from the material web 10 rolled up again after passing the die, and then fed as a roll to a forming, cut-off, filling and closing line. The latter procedure has the advantage that it can be elected either to provide the creases first and then the score lines, or, the other way around, to provide the score lines first and then the creases.

The pouring spout to be provided later on must be provided at an exact distance from the crease which forms the transverse edge of the top surface of the liquid pack to be folded. By means of an optical sensor 19, the time when this crease passes the sensor 19 is detected. At a different point, likewise by means of an optical detector 20, the time when a score line passes this sensor 20 is determined. If the score line is in register with the

crease referred to, there is a fixed time difference between the signals generated by the sensors 19, 20. Deviations from this fixed time difference are measured by the difference measuring device 21. These deviations can occur as a result of elongation/shrinkage of the material web 10 and/or through occurring slip of the material web 10 relative to the driving rollers. The sensor 19 registers the length deviations per packaging unit in the form of a time difference. To avoid erratic adjustment of measured deviations, a number of measurements – for instance 5 to 10 – are collected by the two sensors 19, 20 and adjustment proceeds on the basis of a calculated average deviation. The last measurement of the sensors 19, 20 replaces the oldest measurement stored in the difference measuring device 21. Depending on the measured time difference, the laser source/scanner 15, 14 is controlled via the regulating device 22 to advance or delay the starting time of the laser beam. The difference measuring device corrects the time differences during run-up (acceleration), run-out (slow-down) and transitions to other speeds of the material web. Since per packaging unit several creases pass the sensor 19 - the creases for the lower edge and the upper edge of the liquid pack to be formed - the sensor 19 should be activated shortly before the relevant crease passes - for instance 10 mm.

In Fig. 3 the application of a photocell for detecting a crease, or a score line, is represented, with the position of the crease being detected through a change of the reflected signal. Detecting a crease can be done both on the concave and on the convex side.

Liquid packs can be provided with many kinds of pouring spouts and pouring closures requiring pulling or pushing to create a pouring/dosing opening. It holds for all spouts/closures that they are provided properly in register for the purpose of a correct opening, pouring/dosing of the contents of these packages.

CLAIMS

1. A method for providing score lines in an advancing web of packaging material with the aid of a controllable laser beam, wherein the score lines are provided in register with a regular pattern present on the advancing web, characterized in that the regular pattern consists of creases, the position of which is detected by means of an optical sensor.

2. A method according to claim 1, characterized in that the signal of the optical sensor for detecting a crease is compared with a signal of a sensor for detecting a score line, wherein the time of providing the score line is advanced or delayed depending on the magnitude and direction of the time difference between the two above-mentioned signals.

3. A method according to claim 1, characterized in that the optical sensor for detecting a crease or a score line, respectively, consists of a photocell for determining a difference in reflection.

4. A method according to claim 1, characterized in that the optical sensor for detecting a crease or a score line, respectively, consists of a laser sensor for detecting a difference in distance.

5. A method according to claim 1, characterized in that the optical sensor for detecting a crease or a score line, respectively, consists of a CCD camera.

6. A method according to any one of claims 3-5, characterized in that the optical sensor can be arranged both on the concave and on the convex side of a crease.

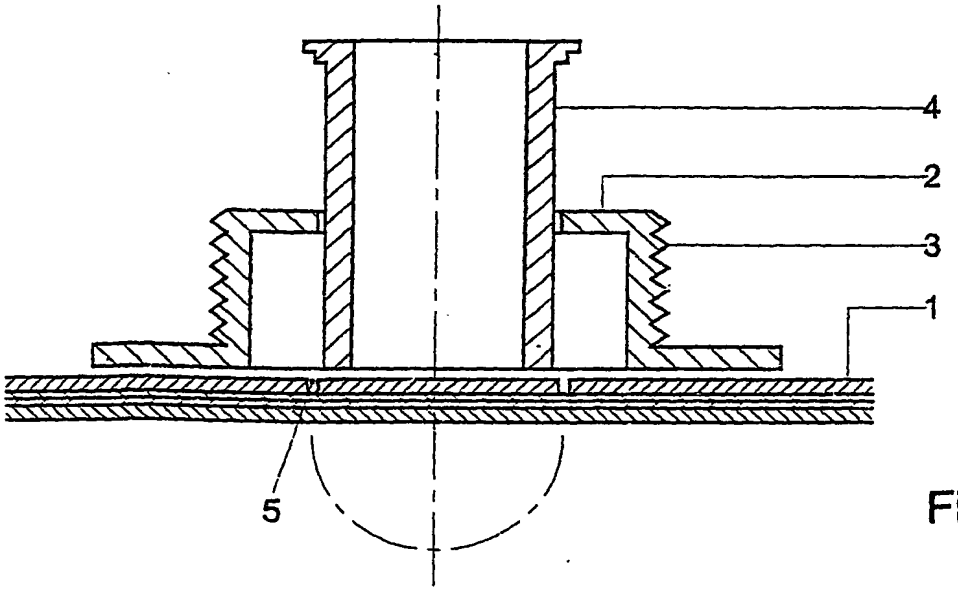


Fig. 1a

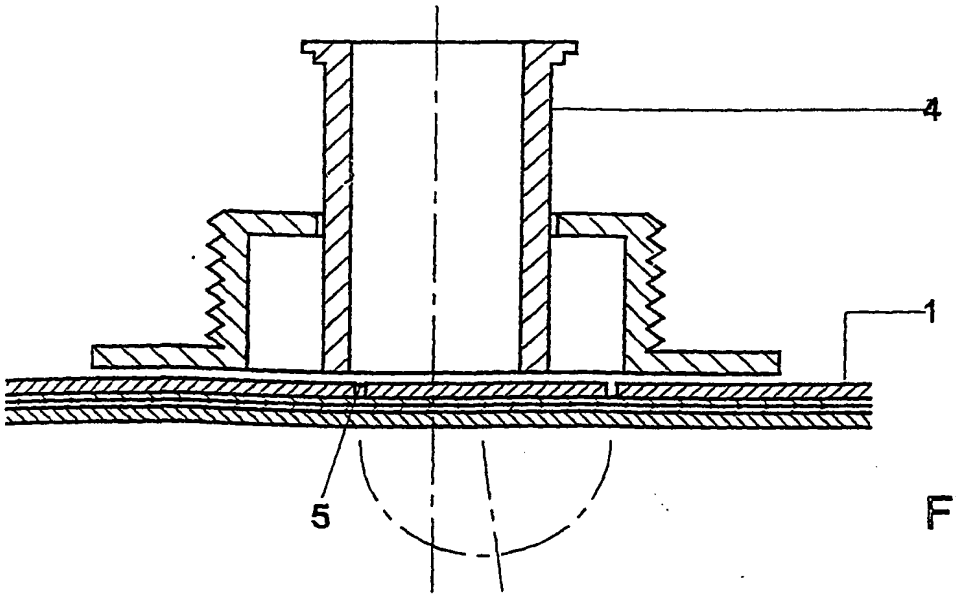


Fig. 1b

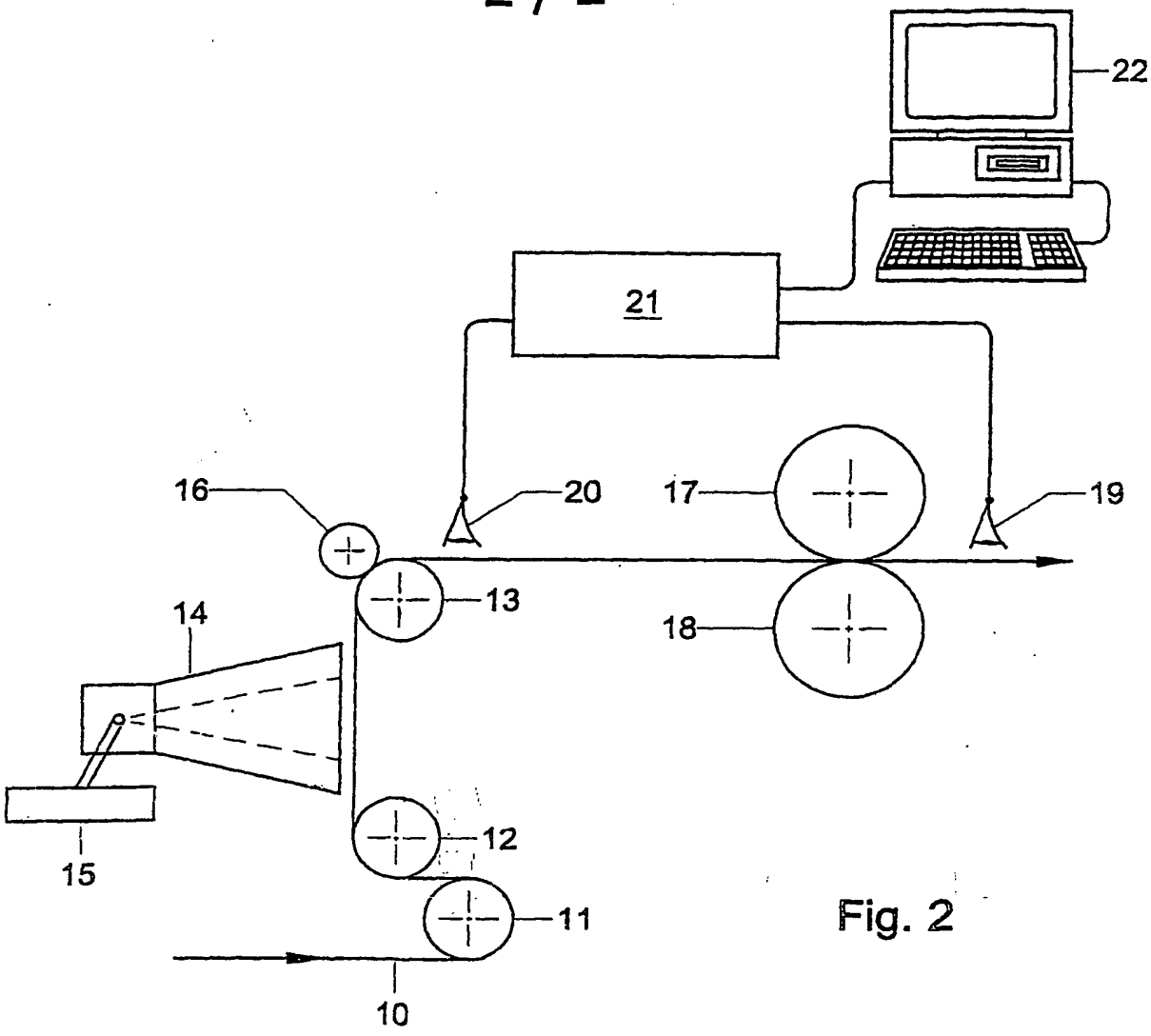


Fig. 2

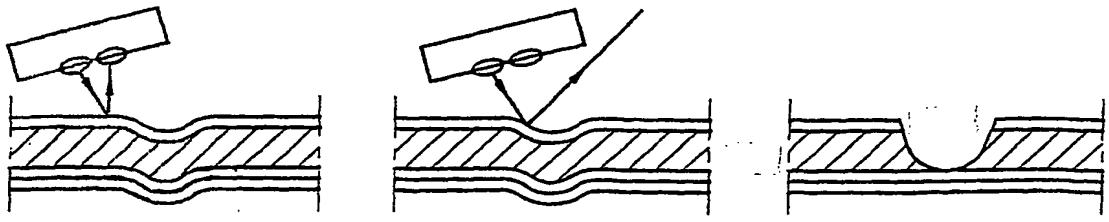


Fig. 3

INTERNATIONAL SEARCH REPORT

Inter d Application No
PCT/EP 01/09863

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B31B1/74 B31B1/25

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
WPI Data, PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 357 841 B (LEEUWARDER PAPIER) 2 March 1994 (1994-03-02) cited in the application column 5, line 48 - line 54	1
A	US 6 046 427 A (MOSIG MICHAEL ET AL) 4 April 2000 (2000-04-04) claims 1,2,8,9	1-3,5
A	WO 88 03089 A (COORS CO ADOLPH) 5 May 1988 (1988-05-05) claim 2	2
A	EP 0 668 499 A (CMD CORP) 23 August 1995 (1995-08-23) claims	3

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

mation on patent family members

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